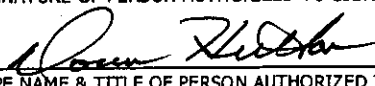
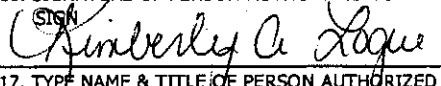


FEDERAL EMERGENCY MANAGEMENT AGENCY <b>INTERAGENCY AGREEMENT</b>		PAGE <b>1</b>	OF <b>2</b>
1. INTERAGENCY AGREEMENT NO. HSFEEM-05-X-0151		2. EFFECTIVE DATE	
4. ISSUED BY Department of Homeland Security/FEMA NETC Acquisition Section Building E 16825 South Seton Avenue Emmitsburg MD 21727		3. PROJECT/REQUISITION NO. E388413Y	
6. AGENCY PERFORMING SERVICE U. S. CONSUMER PRODUCT SAFETY COMMISSION  EAST WEST TOWERS 4330 EAST WEST HIGHWAY, SUITE 600  BETHESDA MD 20814		5. NAME, TITLE & PHONE NUMBER OF EACH GOVERNMENT PROJECT OFFICER FOR BOTH AGENCIES  Bob McCarthy (301) 447-1130 (FEMA PO)  Arthur Lee (301) 504-7539 (Other Agency's Project Monitor)	
7. PROJECT TITLE Wireless Smoke Alarm Technology Improvement Research			
8. PROJECT OBJECTIVE  The objective of this IAA is to conduct research into improvements to residential smoke alarm/detectors through the use of evolving wireless technologies not before available for application in the development of residential smoke alarms/detectors. This research and subsequent prototype development will hopefully result in earlier detection of fire situations in residential structures, and lead to the development of a remote detector system that transmits a signal to the base smoke alarm system sooner to allow residential occupants greater time to escape and/or react to fire situations in their homes.			
9. PERFORMANCE PERIOD OF AGREEMENT Date of Award through June 30, 2006.			
10. ACCOUNTING AND APPROPRIATION DATA See Continuation Sheet		11. DOLLAR VALUE OF AGREEMENT \$100,000.00	
12. FUNDING (The Federal Emergency Management Agency agrees to advance/reimburse funds up to the dollar amount of this agreement, upon receipt of a properly executed Standard Form 1080 or 1081. The appropriate form must be executed in original and six copies, be identified with agreement number and accounting data, and transmitted to the following office for funds action.)  Department of Homeland Security/FEMA NETC Budget and Finance, E-115  16825 South Seton Avenue Emmitsburg, MD 21727  FEMA shall reimburse the Agency cited in Block 6 of this form for expenses incurred in providing the requested services with the exception of those that may be caused by administrative error of the agency cited in Block 6 (for example, payment of interest to contractors due to late payment)  (Any funds not utilized for the performance of the work described in this agreement must be returned to the Federal Emergency Management Agency.)			
13. PURSUANT TO THE AUTHORITY OF Federal Fire Prevention & Control Act of 1974; Section 21(a) (15USC 2218)  (The Federal Emergency Management Agency may enter into this agreement, the person executing this agreement has a written delegation of authority to do so on behalf of the agency.)			
14. SIGNATURE OF PERSON AUTHORIZED TO SIGN 		16. SIGNATURE OF PERSON AUTHORIZED TO SIGN 	
15. TYPE NAME & TITLE OF PERSON AUTHORIZED TO SIGN Donna Hutton, Contracting Officer US CONSUMER PRODUCT SAFETY COMMISSION		17. TYPE NAME & TITLE OF PERSON AUTHORIZED TO SIGN Kimberly A. Logue Contracting Officer <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	

## CONTINUATION PAGE

## A.1 PRICE/COST SCHEDULE

ITEM NO.	DESCRIPTION OF SUPPLIES/SERVICES	QTY	UNIT	UNIT PRICE	AMOUNT
0001	CPSC Wireless Smoke Alarms Research	1.00	JOB	\$100,000.00	\$100,000.00
FUNDING/REQ NO:		1:	\$100,000.00	E388413Y	
GRAND TOTAL ---					\$100,000.00 =====

## ACCOUNTING AND APPROPRIATION DATA:

ACRN APPROPRIATION	REQUISITION NUMBER	AMOUNT
1 2005-62 -6210RB-6340 -	-2589-D E388413Y F	\$100,000.00

## FOR CPSC:

ALC: 61-00-0001  
 TIN: 520978750  
 DUNS: 069287522  
 US TREASURY CODE: 6150100

APPROPRIATION DATA: 05 PS EXOB 4400 21557 252b  
 \$100,000.00

**ARTICLES  
INTERAGENCY AGREEMENT  
HSFEEM-05-X-0151**

**1. PURPOSE**

The Department of Homeland Security/FEMA, U.S. Fire Administration (USFA), hereby enter into an agreement with the US Consumer Product Safety Commission (CPSC) for research into the use of wireless technology that might be utilized residential fire alarms/smoke detectors. The results of this research will be used to develop a prototype wireless component that can breach fire barriers to activate other "traditional wired" alarms/detectors in the home to sound a warning quicker than that of the traditional wired systems. This will enable residents to be alerted much sooner of a potential fire situations, thus, greatly increasing the response period for both egress time necessary for safe escape from the fire affected areas as well as time to notify the appropriate authorities for prompter response to a residential fire incident. It is a widely held belief that this technology will result in the reduction of both the risk of loss of life as well as the loss and damage to property resulting from residential fires.

**2. AUTHORITY**

The Federal Fire Prevention & Control Act of 1974, Section 21(a) as amended (15 USC 2218).

**3. STATEMENT OF WORK AND SCHEDULE OF DELIVERABLES**

The statement of work is included as Attachment 1 to this agreement package.

**4. PERIOD OF PERFORMANCE**

The period of performance for this Interagency Agreement is from the effective date (date of issue) through (15) months.

**5. DEFINITIONS**

Requesting Agency: The funding/requesting agency named in 1 above, or any duly authorized representative.

Servicing Agency: The federal agency/bureau that is performing services or providing goods under this agreement named in 1 above, or any duly authorized representative as agreed to by both parties.

**6. COMPETITION REQUIREMENTS FOR THE SERVICING AGENCY**

All acquisitions awarded by the servicing agency if applicable in performance of this Payable IAA shall comply with the Competition

in Contracting Act (CICA), Public Law 98-369.

## 7. ADMINISTRATION

Administration of this requirement is the responsibility of CPSC. CPSC shall monitor project performance, and other program management functions.

## 8. PROJECT OFFICIALS

### A. ROLES

1. The Project Manager (PM) is designated by the Servicing Agency and shall be that agency's principal official involved in the project. The PM is responsible for assuring performance of the services outlined in this Interagency Agreement and compliance with all its provisions. His/her primary interaction with the Requesting Agency for technical guidance shall be with the Contracting Officer Technical Representative.
  2. The Contracting Officer Technical Representative (COTR) shall be an official of the Requesting Agency. The COTR designated by FEMA shall be responsible for the review and monitoring of the services provided.
  3. The Contracting Officer (CO) has full authority to negotiate, administer and execute all business matters of this Interagency Agreement. Further, should any changes to the scope, budget, schedule, or any other terms of the agreement become necessary, only the CO shall have the authority to amend the Interagency Agreement.
- B. The COTR does not have the authority to alter any obligations under this Interagency Agreement. He/She is not authorized to make any representations or commitments of any kind on behalf of the CO for the Requesting Agency. Any circumstances which may arise requiring a change in the terms of this Interagency Agreement shall be referred to the CO by the COTR with his/her analysis and recommendations. The CO shall retain final authority to implement any changes to this Interagency Agreement.

### C. IDENTIFICATION

1. The Project Manager is: Arthur Lee  
(301) 504-7539
2. The COTR is: Bob McCarthy  
(301) 447-1130

3. The Contracting Officer is: Bryan S. McCreary  
(301)447-1058

9. FUNDING

The servicing agency is limited to recovery of actual costs only. The servicing agency shall notify the requesting agency's COTR/POC in writing when the costs incurred and outstanding commitments equal 80% percent of the estimated total costs. The servicing agency shall make no other commitments or expenditures beyond 100% of funds obligated and shall be excused from further performance of the work unless and until the requesting agency's Contracting Officer (CO), or other authorized official, increases the total obligation under this agreement by modification.

10. Billing Instructions/Support Documentation for Expenditures

Billing and reimbursement may be handled through the Intra-governmental Payment and Collection (IPAC) system, or the servicing agency may submit invoices when the work is completed or as otherwise authorized. The Payable IAA number, the Agency Locator Codes, appropriate accounting code(s), and associated dollar amounts must be referenced on all IPAC transactions or invoices.

If IPAC is used, the servicing agency shall provide documentation supporting all charges to the requesting agency's COTR/POC. In the event that advance payment is requested and authorized, the servicing agency shall furnish expenditure reports to the COTR/POC on a monthly basis.

If invoices are used, the invoices, along with supporting documentation, shall be submitted to the requesting agency's payment office as shown on the Payable IAA form, with a copy furnished to the COTR/POC. Per the Economy Act and Federal Acquisition Regulation 17.505, bills or requests for advance payment will not be subject to audit or certification in advance of payment. Both agencies agree to promptly discuss and resolve issues and questions regarding payments. The servicing agency will promptly initiate year-end and closeout adjustments once final costs are known.

11. TRAVEL

All travel as determined to be necessary under this Payable IAA shall be in accordance with the Federal Travel Regulations.

12. PROMPT PAYMENT

The servicing agency shall not assess the requesting agency for any prompt payment interest charged to the servicing agency.

### 13. MODIFICATIONS

When appropriate, a unilateral administrative modification will be issued by the requesting agency, e.g., to add funds with no change to the SOW, to change a COTR/POC name. A written bilateral modification (i.e., agreed to and signed by authorized officials of both parties) will be issued to change the Payable IAA, modify the SOW, etc.

### 14. PROPERTY

Non-expendable property purchased from funds supplied under this agreement shall become an asset of the requesting agency unless otherwise agreed to in writing by both agencies. Purchase of equipment required for performance of the work must be authorized under this Payable IAA.

### 15. THIRD PARTY LIABILITY

With respect to third-party liability for acts arising out of the performance of official duty by a government employee of the servicing agency, the servicing agency undertakes responsibilities for the investigation, adjudication, settlement, and payment of any claim asserted against the United States; except that, in all cases, the responsibility for the investigation, adjudication, settlement, and payment of any claim with respect to third-party liability arising out of the use, damage, or destruction of loaned personal property shall be the responsibility of the particular agency that has custody and control of the said personal property. In addition, the servicing agency representative shall have the duty of investigating and reporting, in accordance with the servicing agency's regulations and policies, incidents occurring on, or involving that servicing agency's real property, and the requesting agency agrees to cooperate fully in such investigations.

### 16. Disputes

Nothing in this agreement is intended to conflict with the current requesting agency or Treasury directives. However, should disagreement arise as to the interpretation of the provisions of this agreement that cannot be resolved between the servicing agency program office and the requesting agency COTR/POC, the area(s) of disagreement will be reduced to writing by each agency and presented to the authorized officials at both agencies for resolution. If settlement cannot be reached at this level, the disagreement will be raised to next level in accordance with servicing agency and requesting agency procedures for final resolution.

17. CANCELLATION OF THE INTERAGENCY AGREEMENT

Termination of this Agreement may be effected by either party upon 60 days written notice.

18. PROJECT COMPLETION AND CLOSEOUT

When the requesting agency has accepted all deliverables related to the SOW, the servicing agency will provide a written project evaluation and final accounting of project costs to the requesting agency CO. The servicing agency account will then be closed and any remaining funds will be returned to the requesting agency immediately. After final accounting, the remaining balance in the project account will be deobligated by Payable IAA modification.

19. ACCESSIBILITY OF ELECTRONIC AND INFORMATION TECHNOLOGY

Each Electronic and Information Technology (EIT) product or service furnished under this agreement shall comply with the Electronic and Information Technology Accessibility Standards (36 CFR 1194), which implements section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d).

20. CONTENT OF THE INTERAGENCY AGREEMENT

This Interagency Agreement number HSFEEM-05-X-0151 consists of the following:

- A. FEMA Form 40-3, Interagency Agreement.
- B. Schedule of Articles 1 through 20.
- C. Statement of Work

**CPSC-I-05-1084**

**INTERAGENCY AGREEMENT**

**BETWEEN THE**

**U.S. FIRE ADMINISTRATION**

**AND THE**

**U.S. CONSUMER PRODUCT SAFETY COMMISSION**

**I. BACKGROUND**

According to estimates by the National Fire Protection Association and the U. S. Fire Administration, U.S. home usage of smoke alarms rose from less than 10% in 1975 to at least 95% in 2000, while the number of home fire deaths was cut nearly in half. The home smoke alarm has been credited as one of the greatest success stories in fire safety in the last part of the 20<sup>th</sup> century. A key component that helped launch the use of smoke alarms in homes was the independent set of tests (a.k.a Dunes Tests) conducted in 1975-76 by the National Bureau of Standards and Technology (NIST). These tests demonstrated the potential for smoke alarms in saving lives.

In 2000, the U.S. Consumer Product Safety Commission (CPSC) staff coordinated the evaluation of current and emerging smoke alarm technology responses to common residential fire scenarios and nuisance alarm sources. CPSC staff worked with interested organizations such as the U.S. Fire Administration (USFA), the National Institute for Standards and Technology (NIST), the Center for Disease Control and Prevention, the U.S. Department of Housing and Urban Development, the National Fire Protection Association (NFPA), and Underwriters Laboratories, Inc. (UL) in developing and funding a two-year project for evaluating smoke alarms in full-scale fire tests.

The project was initiated in October 2000 and completed in December 2002 by NIST under the direction of a steering committee of the sponsoring organizations along with NFPA, the University of Maryland, and the National Research Council of Canada. At the completion of the project, NIST released a technical report, *Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings (NIST Technical Note 1455) December 2003*.

Tests were conducted in actual homes of representative sizes and floor plans, utilized actual furnishings and household items for fire sources, and tested actual smoke alarms currently sold in retail stores. Smoke alarm performance was quantified in terms of the escape time provided by groups of alarms installed in accordance with typical code provisions.



The NIST testing showed that using alarms in the bedrooms, in addition to placement of alarms on every level, reduced the time to alarm for every fire scenario tested with most alarm technologies. Adding an alarm in the bedroom provided an additional 3 to 923 seconds (15 minutes, 23 seconds) of available egress time, depending on the fire scenario. As expected, alarm times for the bedroom fire scenarios were most affected by the additional alarms, since alarms were now included in the room of fire origin.

Adding interconnected smoke alarms in bedrooms increased the escape time provided, especially for smoldering fires. Smoke alarms in the bedrooms increased the escape time as much as 900 seconds (15 minutes). The report states that the test data provides a basis for evaluating whether smoke alarms should be required in bedrooms of homes built prior to 1993.

Interconnected smoke alarms allow all of the smoke alarms in a home to sound if any individual smoke alarm detects smoke. This can result in an increase in the amount of time available for an occupant to egress the home, if the initiating smoke alarm sounds in the farthest part of the home. Many homes do not have the added protection provided by interconnected smoke alarms. Most homes in the U.S. were constructed before hardwired and interconnected smoke alarms were required by the National Fire Alarm Code (NFPA 72).

Before NFPA 72 required interconnected smoke alarms on every level of the home and outside the sleeping area, battery-only-powered smoke alarms were typically installed in homes. Depending on the size and layout of the home, if a fire occurred in a remote section of the home --- away from the bedrooms--, the closest smoke alarm to the fire would sound. However, such a remote alarm may not be sufficiently audible to be heard by some occupants or to awaken sleeping occupants. As the fire progresses and smoke travels to a smoke alarm that is closer to the bedrooms, this may result in a sound level sufficient to awaken or be heard by the occupants. The delay before a closer smoke alarm notifies the occupants may dramatically reduce the amount of escape time, perhaps leaving the occupants with only seconds to exit the home.

Beginning in 1993, NFPA 72 required interconnected smoke alarms on every level of the home and outside the sleeping area for new construction. This was typically referred to as "hardwired" smoke alarms. NFPA 72 did not require smoke alarms in the bedrooms nor did it require hardwired smoke alarms to have battery back-up. The Code also did not require existing homes to be retrofitted with interconnected smoke alarms, largely because of the financial burden this would place on homeowners.

NFPA 72 was later changed in 1996 to require installation of hardwired smoke alarms with battery back-up in new construction and to require installation of hardwired smoke alarms in the bedrooms or sleeping area. This change to require smoke alarms in the bedrooms was to address the concern associated with the loss in sound level when occupants sleep with the bedroom doors closed. The interconnected smoke alarm in the bedroom provided increased assurance that the alarm sound level would be sufficient to wake sleeping occupants, and it also provided additional protection if the bedroom was the room of fire origin.

Today's technology may allow a battery powered smoke alarm to communicate with other smoke alarms in the home without significantly increasing the manufacturing cost or depleting the life of a standard 9-volt alkaline battery within a year.

In 2003, CPSC contracted the Naval Research Laboratory to determine the feasibility of incorporating wireless technology in battery-powered smoke alarms, which allows them to communicate with each other. Wireless technology in a smoke alarm could also be used to trigger remote-dependent devices that output sound at a frequency lower than a piezoelectric horn. The remote-dependent devices could be powered by 120 VAC and could plug into a household receptacle.

The work by the Naval Research Laboratory demonstrated that it is feasible to incorporate wireless technology into battery-powered smoke alarms. NRL built prototype smoke alarms using a transmitter and receiver circuit in each of the prototype alarms. If any smoke alarm detected smoke, it transmitted a signal to the other smoke alarms. Each receiving smoke alarm also acted like a repeater; thus, a smoke alarm that may have been too far away to be activated by the initiating smoke alarm could be activated by a closer smoke alarm that was transmitting an alarm signal. The transmitting range and the rate at which the receiver checked for an alarm signal were factors in determining the power requirements. To be an effective system, all the smoke alarms in the home would need to include RF transmitter/receiver circuitry. This method would improve audibility by sounding all smoke alarms when any one smoke alarm detected smoke.

The recent NIST testing also concluded that smoke alarms of either the ionization type or the photoelectric type consistently provided some amount of escape time. However, the escape times measured in this study were systematically shorter than those found in the "Dunes Tests" study conducted in the 1970s. This is related to a combination of factors: faster fire development times for today's products that provide the main fuel sources for fires, different criteria for time to untenable conditions, and improved understanding of the speed and range of threats to tenability. In many cases, available escape times would be sufficient only if the occupants followed the advice of fire safety educators, including sleeping with doors closed while using interconnected smoke alarms to provide an audible alarm in each bedroom, and pre-planning and practicing escape so as to minimize pre-movement and movement times during egress.

As mentioned earlier, interconnected smoke alarms allow better audibility and notification when any smoke alarm has detected smoke, but earlier detection by a smoke alarm would also be needed to increase the amount of escape time before untenable conditions.

In co-operation with the USFA the CPSC will coordinate the evaluation of current smoke alarm technology to determine if new technology or methods can be used to allow faster detection of a fire. In part or whole, the research may be contracted to another organization if determined beneficial in completing the objectives and goals, under the guidance of CPSC. As noted in

Section II & III of the Statement of Work, this research will provide the basis for reaching a number of objectives.

## II. PURPOSE AND OBJECTIVES

The purpose of the project is to determine if wireless technology used in fire alarms can reduce the threat of residential fire in order to allow increased egress time in a fire scenario.

As specified in Section III, and as listed below, the following objectives must be met to complete the project:

1. *Investigate various technologies and methods to allow earlier detection of a fire.*
2. *Investigate using wireless technology to signal smoke alarms for earlier fire detection.*
3. *Determine the feasibility of incorporating the technology into a residential fire alarm system.*
4. *Build a prototype unit fire alarm system.*
5. *Test the prototype fire alarm system.*
6. *Issue a report.*

## III. STATEMENT OF WORK

CPSC (or its resultant contractor) will investigate various technologies and concepts to improve the detection of fire. The investigation will determine the feasibility of incorporating the technology or concept in residential homes. CPSC will evaluate using wireless technology to improve the detection of fire in a residential home. Concepts of using a remote detector that transmits a signal to base smoke alarms will be evaluated. The concept of incorporating fire breaching detection sensors in appliances or other home equipment that will transmit a wireless signal to a base smoke alarm will be evaluated. CPSC will furnish all necessary personnel, materials, services, and facilities to complete the objectives list in Section II above and as described below in detail.

The contemplated work consists of a series of tasks for which approximate budgets have been assigned as shown below. CPSC may make adjustments as needed in the distribution of its resources as long as the total cost of the project is not increased and all project objectives are met.

### A. TASKS

1. Investigate various technologies and methods to allow earlier detection of a fire.

The project staff will investigate various technologies and methods that can be incorporated in a smoke alarm or fire system to allow earlier detection of a fire.

2. Investigate using wireless technology to signal smoke alarms for earlier fire detection.

Investigate whether wireless technology, similar to that used by NRL, can be used to decrease the detection time of a fire.

3. Determine the feasibility of incorporating the technology into a residential fire alarm system.

Once a method and technology has been identified, determine the feasibility of incorporating the technology and method into a smoke alarm or fire alarm system. Evaluate power requirements, calculate effectiveness, and evaluate possible advantages and disadvantages for consumers and manufacturers.

4. Build a prototype unit fire alarm system.

Construct a prototype smoke alarm or fire alarm system with the additional technology and methods determined in Task 3.

5. Test the prototype fire alarm system.

Test the prototype smoke alarms or fire alarm system. The testing may include installing it in a consumer home for a length of time, conducting periodic testing, and obtaining occupant feedback data sheets.

6. Issue a report: *To be delivered not later than 15 months from the award of the Interagency Agreement.*

Issue a report describing the tasks performed, and findings for the entire project.

## **B. DELIVERY SCHEDULE**

1. Testing - To be completed within 10 months after award date of the Interagency Agreement.
2. Progress reports – Quarterly
3. Delivery of final report: Not later than 15 months from the award date of the Interagency Agreement.
4. Test data (in several formats, if appropriate) – Must be included with the final report.